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# Diversity and Status of avifauna from Balmiki Ashram to Temple Tiger in Chitwan National Park, Nepal

**Praveen Kumar Jha**

**ABSTRACT**

The study on Diversity and status of avifauna from Balmiki Ashram to Temple Tiger in Chitwan National Park, Nepal was explored during two visits (summer and winter) from January 2017 to December 2017. In total, 165 species of birds belonging to 11 orders and 47 families were observed. Sylviidae was the most dominant family with 19 species, and its relative diversity index was also found to be the highest (relative diversity index = 11.51). The analysis of data on residential status revealed that 120 species were residents, 36 species were winter visitors, eight species were summer visitors and only one species was passage visitor. The analysis of feeding habits showed that a maximum number of species (72 species) were omnivorous, 51 species were insectivorous, 34 species were carnivorous and eight species were frugivorous. According to the International Union for the Conservation of Nature, 137 species were in the Least Concern category, 15 species were in the Near Threatened category, eight species were in the vulnerable category, three species were in the Endangered category, and two species were in the Data Deficient category. Thus, the Balmiki Ashram to Temple Tiger area in Chitwan National Park supports a sound avifaunal diversity. Its proper management will not only improve the situation for its resident species, but will also attract more migratory species in the future.

**Keywords:** Avifauna, Diversity, Chitwan National Park, Visitor

**1. INTRODUCTION**

Birds are among the best monitors of environmental changes (Sarkar et al., 2009). The variations in their population, behavior patterns, and reproductive ability have most often been used to examine the long-term effects of habitat fragmentation (Harisha and Hosetti, 2009). Forests lure a large number of avifauna because they provide suitable habitats for most birds, especially those birds that are associated with vegetation, and for most, the existence of trees is a vital component of their life cycle (Koli, 2014). Birds play an important role as scavengers, pollinating agents, help to control population of different insects and pests, besides that it also helps in dispersal of seeds of vegetation (Pathan et al., 2014). Birds have also played an integral role in

tradition and culture of Nepal (Baral et al., 2012). There are about 10,000 living species of birds in the world (Singh, 2015). A high total of 878 species of birds has been reported from Nepal (BCN and DNPWC, 2016). According to BirdLife International (2015), 37 bird species that occur in Nepal are globally threatened and listed in IUCN Red List. BCN and DNPWC (2012) reported 543 species of birds in the Chitwan National Park, much more than in any other protected area in Nepal. The CNP is home to many threatened grassland, wetland and forest birds (DNPWC, 2016). About two-thirds of Nepal's globally threatened birds are reported from this park (Baral and Inskipp, 2005). Apart from the resident birds about 160 migrating and vagrant species arrive in Chitwan in autumn from northern latitudes which includes Russia, China, Siberia, Europe, Australia, Mongolia to spend the winter times here (Jha, 2016). As soon as the winter visitors have left in spring, the summer visitors arrive from southern latitudes which includes South India, Pakistan, Sri Lanka, Philippines, Burma, Africa for breeding (Jha, 2016). The checklist of avifauna of Chitwan district has already been reported by authors; Baral and Upadhyay (2006), BES and DNPWC (2013) and present study aims to provide detailed and minute information about relative abundance, seasonal status and habitat of birds.

## 2. MATERIALS AND METHODS

### Study Area

Chitwan National Park (27°30'N, 84°20'E) is the first and oldest National Park of Nepal and was established in 1973 (DNPWC, 2016). Chitwan National Park is situated in south-central Nepal, covering an area of 952.63 sq. Km (DNPWC, 2017). The CNP is situated in the southern part of Chitwan district, and it shares eastern boundary with Parsa National Park and southern boundary with Balmiki Tiger Reserve of India (DNPWC, 2017). UNESCO designated the park a World Heritage Site in 1984 and is also identified as an important bird area (IBA) by the BirdLife International (DNPWC, 2017). The temperature of Chitwan varies from 7°C (winter) to 41°C (summer) and has an average annual rainfall of 2,600 mm (Jha, 2018).

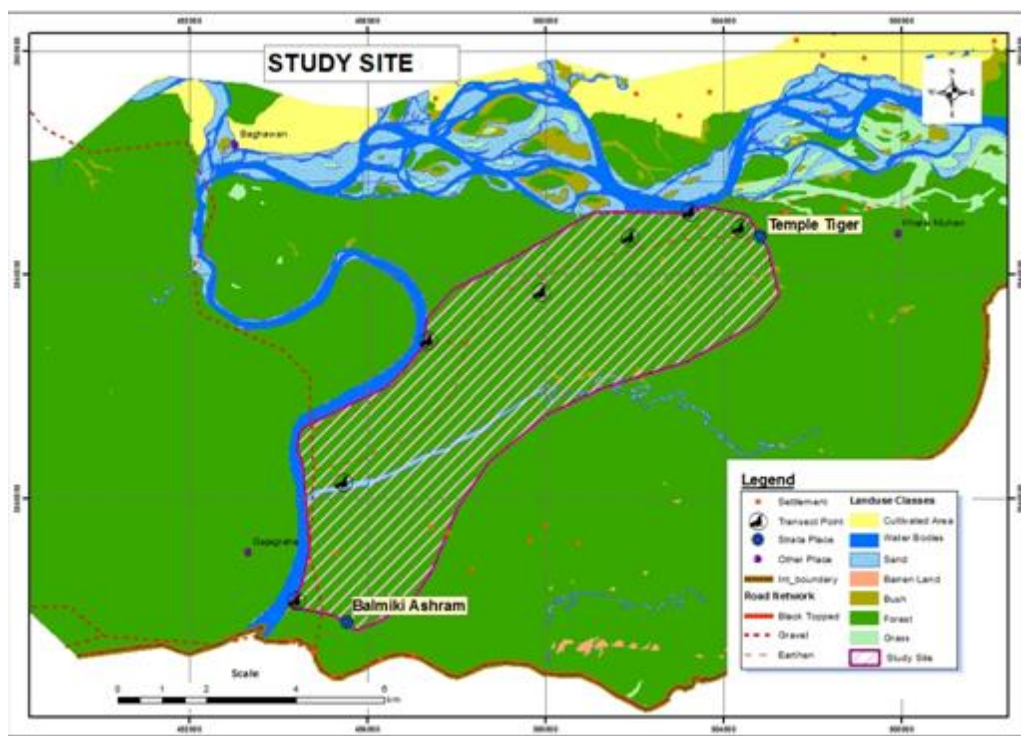


Figure 1 Map showing location of study area

Chitwan National Park has been classified into three main vegetation types; Sal (*Shorea robusta*) forest occupies the 70% of the park, the riverine forest occupies an area of about 7% along the Rapti, Narayani and Reu rivers and their island and is mainly dominated by Simal (*Bombax ceiba*) and grassland (Jha, 2018). Grassland occurs in alluvial flood plains cover 20% of the park area that support luxuriant growth of grasses interspersed with patches of riverine forest (Dinerstein, 2003). The park has many rivers and lakes. Rivers include three major rivers: the Narayani, Rapti and Reu. Major lakes are Bishazari Lake, Tamor Lake, Lami Lake, Garud Lake and Devi Lake (DNPWC, 2017). Chitwan National Park is the third best destination of tourists who visit Nepal (OCNP, 2015).

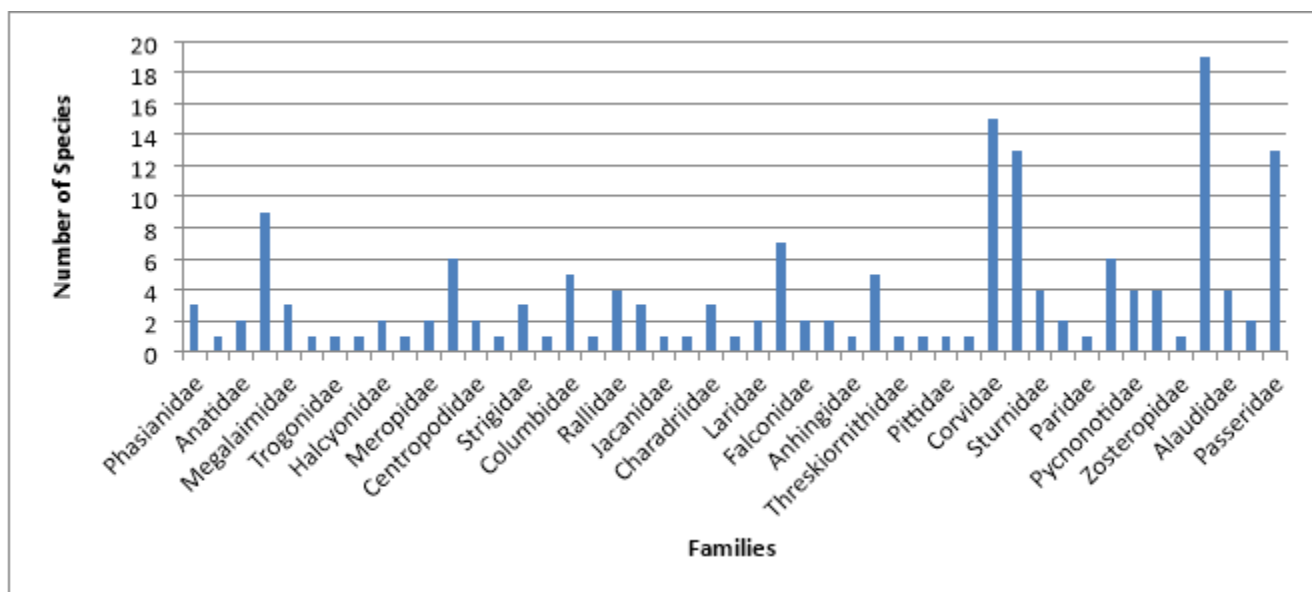
### Methodology

The study was carried out between January 2017 to December 2017. The line transect method was used, as the habitat of the study area was of open type. A total of 32 transects were laid that covered most of the study area. Transect length remained constant (500 m), but the width varied according to survey area and visibility: in forests, 15 m; and in other open fields, 50m. Two visits (summer and winter) were made to study area (Balmiki Ashram to Temple Tiger) of Chitwan National Park. Three days were given to study area during any visit. The observations were done during morning (7:00 AM– 10:00 AM) and evening times (15:00 PM – 17:00 PM), when birds were found to be most active. Birds were observed using the Bushnell H20 Waterproof/ Fogproof Roof Prism Binocular, 10×42-mm, and photographs were taken with a Canon powershot 5×40 HS. In addition, field guides *Birds of the Indian Subcontinent* 2011 by Grimmett, Inskipp and Inskipp and *Birds of Nepal* 2016 by Grimmett, Inskipp, Inskipp and Baral were used in the field survey. The relative abundance of bird species was estimated on the basis of frequency of sightings and number of birds seen. The seasonal status of birds was evaluated on the basis of presence or absence of birds during different seasons. Moreover, the feeding habits of the birds (e.g. as insectivorous, omnivorous and frugivorous) were assigned as described by Ali and Ripley (2007). The International Union for the Conservation of Nature (IUCN) status was also used to compare the local status with the global status. During the surveys, other information or threats to birds' conservation were also noted. Bird species richness was estimated by recording the number of bird species observed. The encounter rate was considered as relative abundance and calculated as the number of bird species observed/distance traveled (Km). The relative diversity (RDI) of families was calculated using the following formula (Torre-Cuadros et al., 2007)

$$\text{RDI} = \frac{\text{Number of bird species in a family}}{\text{Total number of species}} \times 100$$

### 3. RESULTS AND DISCUSSION

The study revealed that a total of 165 species of birds belonging to 47 families and 12 orders were present in the study area (Table 1). Passerine birds dominated the diversity with 86 species compared to non-passerine birds (79 species). Sylviidae is the largest family of birds in Chitwan with 87 species (BES and DNPWC, 2013).



**Figure 2** Family-wise distribution of bird species in the study area

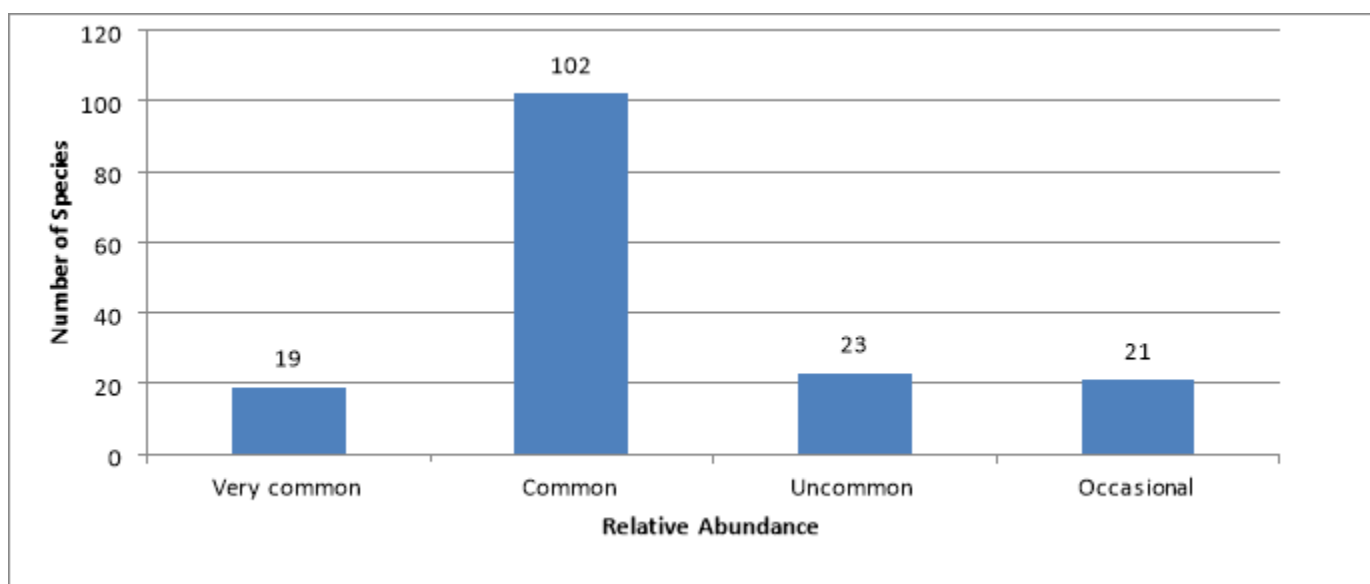
The present investigation also revealed that the Sylviidae family (19 species) 11.51% dominated the avifauna in this area followed by Corvidae (15 species) 9.09%, Muscicapidae and Passeridae (13 species each) 7.87%, Picidae (9 species) 5.45%, Accipitridae (7 species) 4.24%, Cuculidae and Hirundinidae (6 species each) 3.63%, Columbidae and Ardeidae (5 species each) 3.03%, Rallidae, Sturnidae, Cisticolidae, Alaudidae, Pyconotidae (4 species each) 2.42%, Phasianidae, Megalaaimidae, Strigidae,

Scolopacidae, Charadriidae (3 species each) 1.81%, Anatidae, Hylcyonidae, Meropidae, Centropodidae, Laridae, Falconidae, Podicipedidae, Sittidae, Nectariniidae (2 species each) 1.21%. Moreover, 18 families-Dendrocygnidae, Bucerotidae, Trogonidae, Alcedinidae, Cerylidae, Hemiprocidae, Caprimulgidae, Gruidae, Jacanidae, Burhinidae, Glareolidae, Anhingidae, Threskiornithidae, Ciconiidae, Pittidae, Laniidae, Paridae and Zosteropidae were poorly represented in the study area with a single species each 0.60% (Figure 2).

The highest RDi value was also recorded for Sylviidae family 11.51%. Similarly, many other investigators such as (Baral and Upadhyay, 1998; Baral and Upadhyay, 2006; BES and DNPWC, 2013) have also found Sylviidae to be the largest family in the Chitwan National Park and its surroundings. Birds found in family Sylviidae are seen in maximum number because these birds are short-distance flyers as well as forest-dwellers. Along with this, the forest is rich in fruity and flowering plants. Since in Chitwan National Park, there is 70% domination of Sal (*Shorea robusta*) forest, the birds belonging to family Sylviidae was seen more in number.

The highest number of species were found in order Passeriformes (86) 52% followed by Ciconiformes (30) 18.1%, Piciformes (12) 7.27%, Cuculiformes (8) 4.84%, Galliformes and Coraciiformes (6) 3.63%, Columbiformes and Gruiformes (5) 3.03%, Bucerotiformes (2) 1.21% and least number (1) 0.60% in order Apodiformes.

The relative abundance of species was (Figure 3): very common (19), common (102), uncommon (23) and occasional (21). The highest number of species were found in common followed by uncommon, occasional and very common.



**Figure 3** Relative abundance of birds of the study area

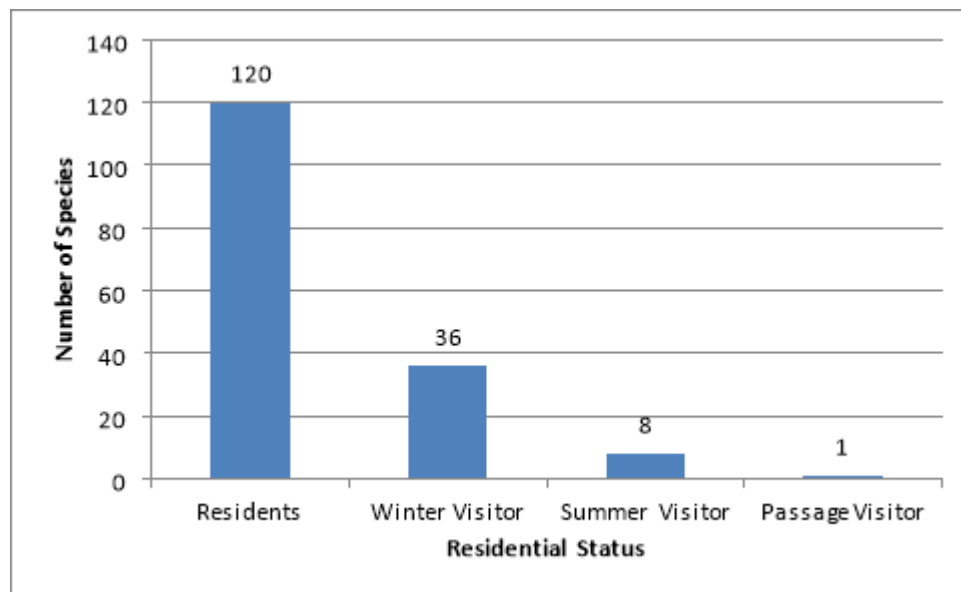
The analysis of data on residential status revealed that out of 165 species, 120 were resident, 36 were winter visitor, eight were summer visitor and one was passage visitor. Thus, winter season was found dominant for bird diversity than summer because the number of migratory birds were more in winter season since, the birds migrated from northern countries as well as from the higher altitude of Nepal to beat the cold. Due to various destructive activities such as human activities within the park, sound pollution, scarcity of water resources, deforestation, use of insecticide & pesticides, inappropriate environmental change, the population of migratory birds have declined and have cause threat to birds population in Chitwan National Park.

An analysis of the feeding habits of these birds showed that a maximum number of species (72 species) were omnivorous, followed by insectivorous (51 species), carnivorous (34 species) and frugivorous (8 species). Chitwan National Park is rich in wetland, Sal-forest, grassland, fruity and flowering plants due to which number of species of omnivorous is most.

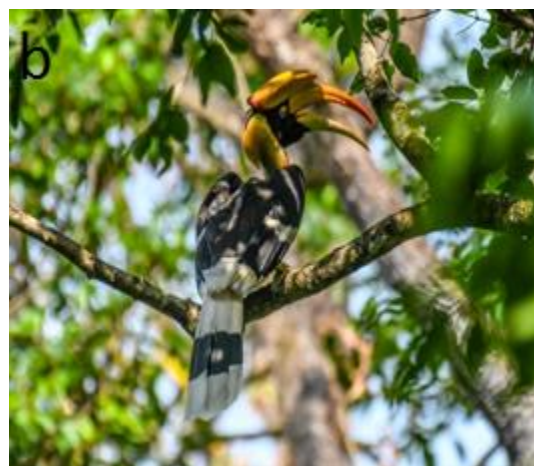
It has been found that there are certain species of birds in the study area that have been classified under different threat categories by the IUCN (version 2018-1). Out of 165 species, 137 were Least Concern, 15 were Near Threatened, eight were Vulnerable, three were endangered and two species were in the Data Deficient category.

This study is very useful and valuable for future researchers and planners on avifauna, especially in global context. Some future management plans are noted by the present investigator, viz., fishing ban, ban on grass cutting during breeding season, fruiting plants should be properly maintained, control of human activities.





**Figure 4** Residential status of bird species in study area



**Figure 5.** Photographic records of some species encountered in the study area

- a:** Ruddy Shelduck (*Tadorna ferruginea*)  
**b:** Oriental Pied Hornbill (*Anthracoceros albirostris*)  
**c:** Red-whiskered Bulbul (*Pycnonotus jocosus*)  
**d:** Fulvous-breasted Woodpecker (*Dendrocopos macei*)

**Table 1** Systematic list and status of birds in the study area

Sl. No.	Order/Family/Common Name/Scientific Name		IUCN Status	Residential Status	Relative Abundance	Feeding Habits
	<b>GALLIFORMES</b>					
	<b>Phasianidae</b>					
1	Black Francolin	<i>Francolinus francolinus</i>	LC	R	C	Omnivorous
2	Indian Peafowl	<i>Pavo cristatus</i>	NT	R	C	Omnivorous
3	Kalij Pheasant	<i>Lophura leucomelanos</i>	LC	R	C	Omnivorous
	<b>ANSERIFORMES</b>					
	<b>Dendrocygnidae</b>					
4	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	LC	R	C	Herbivorous
	<b>Anatidae</b>					
5	Ruddy Shelduck	<i>Tadorna ferruginea</i>	NT	WV	C	Omnivorous
6	Common Merganser	<i>Mergus merganser</i>	LC	WV	C	Omnivorous
	<b>PICIFORMES</b>					
	<b>Picidae</b>					
7	Grey-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>	LC	R	C	Omnivorous
8	Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>	LC	R	C	Omnivorous
9	Rufous Woodpecker	<i>Celeus brachyurus</i>	LC	R	OC	Carnivorous
10	Streak-throated Woodpecker	<i>Picus xanthopygaeus</i>	LC	R	C	Insectivorous
11	Grey-headed Woodpecker	<i>Picus canus</i>	LC	R	C	Omnivorous
12	Himalayan Flameback	<i>Dinopium shorii</i>	LC	R	C	Omnivorous
13	Greater Flameback	<i>Chrysocolaptes lucidus</i>	LC	R	C	Insectivorous
14	Black-rumped Flameback	<i>Dinopium benghalense</i>	LC	R	C	Insectivorous
15	Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>	EN	R	UC	Insectivorous
	<b>Megalaimidae</b>					
16	Lineated Barbet	<i>Megalaima lineata</i>	LC	R	C	Omnivorous
17	Blue-throated Barbet	<i>Megalaima asiatica</i>	LC	R	UC	Omnivorous
18	Coppersmith Barbet	<i>Megalaima haemacephala</i>	LC	R	C	Omnivorous
	<b>BUCEROTIFORMES</b>					
	<b>Bucerotidae</b>					
19	Oriental Pied-Hornbill	<i>Anthracoceros albirostris</i>	NT	R	C	Omnivorous
	<b>TROGONIFORMES</b>					
	<b>Trogonidae</b>					
20	Red-headed Trogon	<i>Harpactes erythrocephalus</i>	EN	R	C	Insectivorous
	<b>CORACIIFORMES</b>					
	<b>Alcedinidae</b>					
21	Common Kingfisher	<i>Alcedo atthis</i>	LC	R	C	Carnivorous
	<b>Hylcyonidae</b>					
22	Stork-billed Kingfisher	<i>Halcyon capensis</i>	LC	R	OC	Carnivorous
23	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	R	C	Carnivorous

	<b>Cerylidae</b>					
24	Pied Kingfisher	<i>Ceryle rudis</i>	LC	R	C	Carnivorous
	<b>Meropidae</b>					
25	Blue-tailed Bee-eater	<i>Merops philippinus</i>	LC	R	C	Insectivorous
26	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	LC	R	C	Insectivorous
	<b>CUCULIFORMES</b>					
	<b>Cuculidae</b>					
27	Pied Cuckoo	<i>Clamator jacobinus</i>	LC	SV	VC	Carnivorous
28	Chestnut-winged Cuckoo	<i>Clamator coromandus</i>	NT	SV	VC	Carnivorous
29	Indian Cuckoo	<i>Cuculus micropterus</i>	LC	SV	C	Insectivorous
30	Drongo Cuckoo	<i>Surniculus lugubris</i>	LC	SV	VC	Carnivorous
31	Asian Koel	<i>Eudynamys scolopacea</i>	LC	SV	C	Omnivorous
32	Green-billed Malkoha	<i>Phaenicophaeus tristis</i>	LC	R	C	Insectivorous
	<b>Centropodidae</b>					
33	Greater Coucal	<i>Centropus sinesis</i>	LC	R	C	Carnivorous
34	Lesser Coucal	<i>Centropus bengalensis</i>	LC	R	C	Insectivorous
	<b>APODIFORMES</b>					
	<b>Hemiprocnidae</b>					
35	Crested Treeswift	<i>Hemiprocne coronate</i>	LC	R	C	Insectivorous
	<b>STRIGIFORMES</b>					
	<b>Strigidae</b>					
36	Oriental Scops Owl	<i>Otus sunia</i>	DD	R	UC	Carnivorous
37	Brown Fish Owl	<i>Ketupa zeylonensis</i>	VU	R	UC	Carnivorous
38	Jungle Owlet	<i>Glaucidium radiatum</i>	LC	R	C	Carnivorous
	<b>Caprimulgidae</b>					
39	Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	NT	R	C	Insectivorous
	<b>COLUMBIFORMES</b>					
	<b>Columbidae</b>					
40	Common Wood Pigeon	<i>Columba palumbus</i>	LC	WV	OC	Frugivorous
41	Orange-breasted Green Pigeon	<i>Treron bicincta</i>	LC	R	C	Frugivorous
42	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	LC	WV	VC	Frugivorous
43	Spotted Dove	<i>Streptopelia chinensis</i>	LC	R	C	Frugivorous
44	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	LC	R	C	Frugivorous
	<b>GRUIFORMES</b>					
	<b>Gruidae</b>					
45	Common Crane	<i>Grus grus</i>	NT	WV	OC	Omnivorous
	<b>Rallidae</b>					
46	Brown Crake	<i>Amaurornis akool</i>	LC	R	C	Omnivorous
47	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	LC	R	C	Omnivorous
48	Common Moorhen	<i>Gallinula chloropus</i>	LC	WV	C	Omnivorous
49	Watercock	<i>Gallicrex cinerea</i>	NT	SV	OC	Omnivorous
	<b>CICONIFORMES</b>					
	<b>Scolopacidae</b>					
50	Common Greenshank	<i>Tringa nebularia</i>	LC	R	C	Carnivorous
51	Common Sandpiper	<i>Actitis hypoleucos</i>	LC	R	C	Carnivorous

52	Temminck's Stint	<i>Calidris temminckii</i>	LC	WV	C	Omnivorous
	<b>Jacanidae</b>					
53	Bronze-winged Jacana	<i>Metopidius indicus</i>	LC	R	C	Omnivorous
	<b>Burhinidae</b>					
54	Eurasian Thick-knee	<i>Burhinus oedicephalus</i>	LC	R	UC	Omnivorous
	<b>Charadriidae</b>					
55	Little Ringed Plover	<i>Charadrius dubius</i>	LC	R	C	Carnivorous
56	Red-wattled Lapwing	<i>Vanellus indicus</i>	LC	R	C	Omnivorous
57	Northern Lapwing	<i>Vanellus vanellus</i>	NT	WV	OC	Carnivorous
	<b>Glareolidae</b>					
58	Little Pratincole	<i>Glareola lactea</i>	LC	R	UC	Omnivorous
	<b>Laridae</b>					
59	Black-headed Gull	<i>Larus ridibundus</i>	VU	WV	OC	Omnivorous
60	Brown-headed Gull	<i>Larus brunnicephalus</i>	VU	WV	OC	Omnivorous
	<b>Accipitridae</b>					
61	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	LC	R	C	Carnivorous
62	Black Kite	<i>Milvus migrans</i>	LC	R	C	Carnivorous
63	Crested Serpent Eagle	<i>Spilornis cheela</i>	LC	R	C	Carnivorous
64	Short-toed Snake Eagle	<i>Circus gallicus</i>	LC	WV	OC	Carnivorous
65	Black Eagle	<i>Ictinaetus malayensis</i>	LC	WV	OC	Carnivorous
66	Shikra	<i>Accipiter badius</i>	LC	R	C	Carnivorous
67	Himalayan Griffon	<i>Gyps himalayensis</i>	VU	WV	UC	Carnivorous
	<b>Falconidae</b>					
68	Collared Falconet	<i>Microhierax caerulescens</i>	NT	R	UC	Carnivorous
69	Common Kestrel	<i>Falco tinnunculus</i>	LC	WV	C	Carnivorous
	<b>Podicipedidae</b>					
70	Little Grebe	<i>Tachybaptus ruficollis</i>	LC	R	OC	Omnivorous
71	Great Crested Grebe	<i>Podiceps cristatus</i>	LC	WV	OC	Omnivorous
	<b>Anhingidae</b>					
72	Oriental Darter	<i>Anhinga melanogaster</i>	NT	R	C	Carnivorous
	<b>Ardeidae</b>					
73	Grey Heron	<i>Ardea cinerea</i>	LC	R	VC	Carnivorous
74	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	LC	R	C	Carnivorous
75	Great Egret	<i>Casmerodius albus</i>	LC	R	UC	Carnivorous
76	Intermediate Egret	<i>Mesophoyx intermedia</i>	LC	R	C	Carnivorous
77	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	LC	R	UC	Carnivorous
	<b>Threskiornithidae</b>					
78	Black Ibis	<i>Pseudibis papillosa</i>	LC	R	C	Omnivorous
	<b>Ciconiidae</b>					
79	Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	R	C	Carnivorous
	<b>PASSERIFORMES</b>					
	<b>Pittidae</b>					
80	Hooded Pitta	<i>Pitta sordida</i>	VU	SV	C	Carnivorous
	<b>Laniidae</b>					
81	Long-tailed Shrike	<i>Lanius schach</i>	LC	R	C	Carnivorous



	<b>Corvidae</b>					
82	Red-billed Blue Magpie	<i>Urocissa erythrorhyncha</i>	LC	R	C	Omnivorous
83	House Crow	<i>Corvus splendens</i>	LC	R	C	Omnivorous
84	Large-billed Crow	<i>Corvus macrorhynchos</i>	LC	R	C	Omnivorous
85	Black-hooded Oriole	<i>Oriolus xanthornus</i>	LC	R	C	Omnivorous
86	Large Cuckooshrike	<i>Coracina macei</i>	LC	R	C	Omnivorous
87	Small Minivet	<i>Pericrocotus cinnamomeus</i>	LC	R	C	Insectivorous
88	Rosy Minivet	<i>Pericrocotus roseus</i>	LC	R	C	Insectivorous
89	Scarlet Minivet	<i>Pericrocotus flammeus</i>	LC	R	C	Insectivorous
90	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	LC	WV	UC	Omnivorous
91	White-throated Fantail	<i>Rhipidura albicollis</i>	LC	R	C	Omnivorous
92	Ashy Drongo	<i>Dicrurus leucophaeus</i>	LC	SV	VC	Omnivorous
93	Bronzed Drongo	<i>Dicrurus aeneus</i>	LC	R	UC	Omnivorous
94	Spangled Drongo	<i>Dicrurus hottentottus</i>	LC	R	C	Omnivorous
95	Common Iora	<i>Aegithina tiphia</i>	LC	R	C	Insectivorous
96	Common Woodshrike	<i>Tephrodomis pondicerianus</i>	LC	R	C	Insectivorous
	<b>Muscicapidae</b>					
97	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	LC	R	C	Carnivorous
98	Tickell's Thrush	<i>Turdus unicolor</i>	LC	WV	UC	Omnivorous
99	Rufous-gorgeted Flycatcher	<i>Ficedula strophiatea</i>	LC	R	OC	Insectivorous
100	Pale-chinned Flycatcher	<i>Cyornis poliogenys</i>	LC	R	C	Omnivorous
101	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	LC	R	C	Omnivorous
102	Verditer Flycatcher	<i>Eumyias thalassina</i>	LC	WV	VC	Insectivorous
103	Oriental Magpie Robin	<i>Copsychus saularis</i>	LC	R	C	Insectivorous
104	Black Redstart	<i>Phoenicurus ochruros</i>	LC	WV	VC	Insectivorous
105	Pied Bushcrafter	<i>Saxicola caprata</i>	LC	R	C	Insectivorous
106	Eurasian Blackbird	<i>Turdus merula</i>	LC	WV	OC	Omnivorous
107	Siberian Rubythroat	<i>Luscinia colliope</i>	LC	WV	C	Insectivorous
108	White-tailed Rubythroat	<i>Luscinia pectoralis</i>	LC	WV	VC	Insectivorous
109	Bluethroat	<i>Luscinia svecica</i>	LC	WV	VC	Insectivorous
	<b>Sturnidae</b>					
110	Brahminy Starling	<i>Sturnus pagodarum</i>	LC	R	UC	Omnivorous
111	Chestnut-tailed Starling	<i>Sturnus malabaricus</i>	LC	R	C	Omnivorous
112	Common Myna	<i>Acridotheres tristis</i>	LC	R	C	Omnivorous
113	Jungle Myna	<i>Acridotheres fuscus</i>	LC	R	C	Omnivorous
	<b>Sittidae</b>					
114	Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	LC	R	C	Omnivorous
115	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	LC	R	C	Omnivorous
	<b>Paridae</b>					
116	Great Tit	<i>Parus major</i>	LC	R	C	Omnivorous
	<b>Hirundinidae</b>					
117	Sand Martin	<i>Riparia riparia</i>	DD	PV	OC	Insectivorous
118	Red-rumped Swallow	<i>Hirundo daurica</i>	LC	R	C	Insectivorous
	<b>Pycnonotidae</b>					
119	Black Bulbul	<i>Hypsipetes leucocephalus</i>	LC	R	VC	Omnivorous

120	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC	R	C	Omnivorous
121	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	LC	R	C	Omnivorous
122	Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC	R	C	Omnivorous
	<b>Cisticolidae</b>					
123	Striated Prinia	<i>Prinia criniger</i>	LC	R	UC	Insectivorous
124	Grey-crowned Prinia	<i>Prinia cinereocapilla</i>	CR	R	UC	Insectivorous
125	Yellow-bellied Prinia	<i>Prinia flaviventris</i>	NT	R	C	Insectivorous
126	Plain Prinia	<i>Prinia inornata</i>	LC	R	C	Insectivorous
	<b>Zosteropidae</b>					
127	Oriental White-eye	<i>Zosterops palpebrosus</i>	LC	R	C	Insectivorous
	<b>Sylviidae</b>					
128	Spotted Bush Warbler	<i>Bradypterus thoracicus</i>	LC	WV	OC	Insectivorous
129	Smoky Warbler	<i>Phylloscopus fuligiventer</i>	LC	WV	UC	Insectivorous
130	Yellow-bellied Warbler	<i>Abroscopus superciliaris</i>	VU	WV	OC	Insectivorous
131	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	LC	WV	C	Insectivorous
132	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	LC	WV	VC	Insectivorous
133	Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	LC	WV	VC	Insectivorous
134	Greenish Warbler	<i>Phylloscopus trochiloides</i>	LC	WV	C	Insectivorous
135	Chestnut-crowned Warbler	<i>Seicercus castaniceps</i>	LC	WV	VC	Insectivorous
136	Common Tailorbird	<i>Orthotomus sutorius</i>	LC	R	C	Insectivorous
137	Rufous-rumped Grassbird	<i>Graminicola bengalensis</i>	EN	R	UC	Insectivorous
138	Lesser Necklaced Laughingthrush	<i>Garrulax monileger</i>	VU	R	C	Omnivorous
139	Greater Necklaced Laughing thrush	<i>Garrulax pectoralis</i>	VU	R	C	Omnivorous
140	Puff-throated Babbler	<i>Pellorneum ruficeps</i>	LC	R	C	Omnivorous
141	White-browed Scimitar Babbler	<i>Pamatorhinus schisticeps</i>	NT	R	UC	Omnivorous
142	Striped Tit Babbler	<i>Macronous gularis</i>	LC	R	C	Insectivorous
143	Jungle Babbler	<i>Turdoides striatus</i>	LC	R	C	Insectivorous
144	Himalayan Cutia	<i>Cutia nipalensis</i>	NT	R	OC	Omnivorous
145	White-bellied Yuhina	<i>Yuhina zantholeuca</i>	LC	R	UC	Omnivorous
146	Nepal Fulvetta	<i>Alcippe nipalensis</i>	LC	R	UC	Omnivorous
	<b>Alaudidae</b>					
147	Rufous-winged Bushlark	<i>Mirafra assamica</i>	LC	R	C	Insectivorous
148	Ashy-crowned Sparrow Lark	<i>Eremopterix grisea</i>	LC	R	UC	Insectivorous
149	Sand Lark	<i>Calandrella raytal</i>	LC	R	C	Insectivorous
150	Oriental Skylark	<i>Alauda gulgula</i>	LC	R	UC	Omnivorous
	<b>Nectariniidae</b>					
151	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	LC	R	UC	Frugivorous
152	Crimson Sunbird	<i>Aethopyga siparaja</i>	LC	R	C	Omnivorous
	<b>Passeridae</b>					
153	House Sparrow	<i>Passer domesticus</i>	LC	R	C	Omnivorous
154	Eurasian Tree Sparrow	<i>Passer montanus</i>	LC	R	C	Omnivorous
155	Chestnut-shouldered Petronia	<i>Petronia xanthocollis</i>	LC	R	UC	Omnivorous

156	White Wagtail	<i>Motacilla alba</i>	LC	WV	OC	Insectivorous
157	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	LC	R	C	Omnivorous
158	Citrine Wagtail	<i>Motacilla citreola</i>	LC	WV	UC	Insectivorous
159	Yellow Wagtail	<i>Motacilla flava</i>	LC	WV	VC	Insectivorous
160	Grey Wagtail	<i>Motacilla cinerea</i>	LC	WV	VC	Insectivorous
161	Paddyfield Pipit	<i>Anthus rufulus</i>	LC	R	C	Omnivorous
162	Richard's Pipit	<i>Anthus richardi</i>	LC	R	UC	Insectivorous
163	Olive-backed Pipit	<i>Anthus hodgsoni</i>	LC	WV	C	Omnivorous
164	Baya Weaver	<i>Ploceus philippinus</i>	NT	R	C	Omnivorous
165	Scaly-breasted Munia	<i>Lonchura punctulata</i>	LC	R	C	Frugivorous

CR= Critically Endangered; EN=Endangered; LC= Least Concern; NT= Near Threatened; VU=Vulnerable; DD= Data Deficient; R= Resident; SV= Summer Visitor; WV= Winter Visitor; PV= Passage Visitor; C= Common; VC= Very Common; UC= Uncommon; OC= Occasional

#### 4. CONCLUSION

During this study period, 165 species of birds representing 12 orders and 47 families were recorded. Passeriformes and Sylviidae were the most dominant order and family. 120 resident types, 36 winter visitors, eight summer visitors and only one passage visitor were observed. There is significant difference in seasonal diversity of birds in the study area. With respect to feeding guilds, largest number of species were recorded from omnivorous followed by insectivorous, carnivorous and frugivorous.

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#### Conflict of Interest

The authors declare that there are no conflicts of interests.

#### Ethical approval

The Animal ethical guidelines are followed in the study for species observation & identification.

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#### Data and materials availability

All data associated with this study are present in the paper.

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